WHAT IS CLAIMED IS

1. A method for manufacturing a 3D image display body which is used to display 3D images in which right-eye image display parts and left-eye image display parts are mixed, said 3D image display body manufacturing comprising:

disposing a phase-difference film on a transparent support with an adhesive agent interposed;

disposing resist members which are made transparent and need not be removed in specified positions on the aforementioned phase-difference film;

eliminating the phase-difference function of the portions of the phase-difference film on which the aforementioned resist members are not present by an appropriate means, and

superimposing or bonding a display member on the side of the resist members following drying.

2. A method for manufacturing a 3D image display body which is used to display 3D images in which right-eye image display parts and left-eye image display parts are mixed, said 3D image display body manufacturing method comprising:

a laminated phase-difference film formed by laminating a TAC film or CAB film, etc., that does not possess birefringence and a drawn PVA film that has a phase-difference function is disposed on a transparent support with an adhesive agent interposed so that the TAC film, etc., is located on the side of the adhesive agent:

resist members which are made transparent and need not be removed are then disposed in specified positions on the aforementioned drawn PVA film,

the phase-difference function of the portions of the drawn PVA film on which the aforementioned resist members are not present is eliminated by an appropriate means, and

a display member is superimposed or bonded on the side of the resist members following drying.

3. The manufacturing method of claim 2 wherein the resist members are linear bodies that are disposed at specified intervals on the drawn PVA film from one side of the drawn PVA film to the other.

4 The manufacturing method of Claim 2 wherein the resist members comprise of a resist ink that is applied to the surface of the drawn PVA film by screen printing.

5 The manufacturing method of Claim 3 wherein the resist members comprise of a resist ink that is applied to the surface of the drawn PVA film by screen printing.

6 The manufacturing method of any one Claim 2 wherein a protective member that does not possess birefringence is disposed on the side of the resist members following drying, and a display member is then superimposed on or bonded to this protective member.

7. The manufacturing method of any one Claim 3 wherein a protective member that does not possess birefringence is disposed on the side of the resist members following drying, and a display member is then superimposed on or bonded to this protective member.

8 The manufacturing method of any one Claim 4 wherein a protective member that does not possess birefringence is disposed on the side of the resist members following drying, and a display member is then superimposed on or bonded to this protective member.

9. The manufacturing method of any one Claim 5 wherein a protective member that does not possess birefringence is disposed on the side of the resist members following drying, and a display member is then superimposed on or bonded to this protective member.

[Document Title] SPECIFICATION

[Title of the Invention]

METHOD FOR MANUFACTURING 3D IMAGE DISPLAY BODY

[Claims]

[Claim 1] A method for manufacturing a 3D image display body which is used to display 3D images in which right-eye image display parts and left-eye image display parts are mixed, said 3D image display body manufacturing method being characterized by the fact that [a] a phase-difference film is disposed on a transparent support with an adhesive agent interposed, [b] resist members which are made transparent and need not be removed are then disposed in specified positions on the aforementioned phase-difference film, [c] the phase-difference function of the portions of the phase-difference film on which the aforementioned resist members are not present is eliminated by an appropriate means, and [d] a display member is superimposed or bonded on the side of the resist members following drying.

[Claim 2] A method for manufacturing a 3D image display body which is used to display 3D images in which right-eye image display parts and left-eye image display parts are mixed, said 3D image display body manufacturing method being characterized by the fact that [a] a laminated phase-difference film formed by laminating a TAC film or CAB film, etc., that does not possess birefringence and a drawn PVA film that has a phase-difference function is disposed on a transparent support with an adhesive agent interposed so that the TAC film, etc., is located on the side of the adhesive agent, [b] resist members which are made transparent and need not be removed are then disposed in specified positions on the aforementioned drawn PVA film, [c] the phase-difference function of the portions of the drawn PVA film on which the aforementioned resist members are not present is eliminated by an appropriate means, and [d] a display member is superimposed or bonded on the side of the resist members following drying.

[Claim 3] A 3D image display body manufacturing method which is characterized by the fact that in the 3D image display body manufacturing method claimed in Claim 2, the resist members are linear bodies that are disposed at specified intervals [on the drawn PVA film] from one side of the drawn PVA film to the other.

[Claim 4] A 3D image display body manufacturing method which is characterized by the fact that in the 3D image display body manufacturing method claimed in either Claim 2 or Claim 3, the resist members consist of a resist ink that is applied to the surface of the drawn PVA film by screen printing.

[Claim 5] A 3D image display body manufacturing method which is characterized by the fact that in the 3D image display body manufacturing method claimed in any one of Claims 2 through 4, a protective member that does not possess birefringence is disposed on the side of the resist members following drying, and a display member is then superimposed on or bonded to this protective member.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a method for manufacturing a 3D image display body which is used to display 3D images.

[0002]

[Prior Art and Problems to Be Solved by the Invention]

3D image display devices such as that disclosed in (for example) USP 5,327,285 have been proposed in the past. In this 3D image display device, as is shown in Figure 1, a film 52 in which right-eye image display parts *a* and left-eye image display parts *b* are alternately disposed side by side is bonded to the surface of a liquid crystal member 51. When the light emitted by the aforementioned liquid crystal member 51 is controlled so that a specified image is displayed, a right-eye image is displayed from the right-eye image display parts *a*, and a left-eye image is displayed from the left-eye image display parts *b*. Furthermore, since [the device] is constructed so that the direction of vibration of the polarized light constituting the right-eye image from the right-eye image display parts *a* has an angle of 90° relative to the direction of vibration of the polarized light constituting the left-eye image from the left-eye image display parts *b* (i.e., since [the device] is constructed so that (for example) the x component of the right-eye image consisting of two components x and y has a phase difference of 180° (π) with respect to the x component of the left-eye image which similarly consists of two components x and y), the observer can experience the sensation of observing a three-dimensional image when the aforementioned image is viewed using polarizing eyeglasses consisting of a polarizer-equipped right-eye lens that transmits only the right-eye image and a polarizer-equipped left-eye lens that transmits only the left-eye image.

[0003]

As has been disclosed in the past in Figure 2 of the aforementioned USP 5,327,285, the aforementioned film 52 in which right-eye image display parts *a* and left-eye image display parts *b* are alternately disposed side by side is manufactured by a method in which a polarizing film formed by laminating a TAC film (triacetylcellulose film) and an iodine-treated drawn PVA film (polyvinyl alcohol film) is coated with a photoresist, and specified portions [of this coated film] are exposed, after which these portions are treated with a potassium hydroxide solution, so that the property that a drawn PVA film has of being able to rotate the direction of vibration of light in a specified wavelength region with the linearly polarized state [of the light] maintained "as is" (phase-difference function) is eliminated, etc. However, since this method is a method in which the photoresist is removed by an alkali treatment following the [above-mentioned] treatment with a potassium hydroxide solution, the drawn PVA film [may be] damaged by this alkali treatment, so that the functions of the right-eye image display parts *a* and left-eye image display parts *b* deteriorate.

[0004]

The present invention provides a method for manufacturing a 3D image display body in which right-eye image display parts *a* and left-eye image display parts *b* are mixed, and which has a good function.

[0005]

[Means Used to Solve the Above-mentioned Problems]

The gist of the present invention will be described below with reference to the attached figures.

[0006]

[The present invention] relates to a method for manufacturing a 3D image display body which is used to display 3D images in which right-eye image display parts *a* and left-eye image display parts *b* are mixed, said 3D image display body manufacturing method being characterized by the fact that [a] a phase-difference film is disposed on a transparent support 1 with an adhesive agent 2 interposed, [b] resist members 4 which are made transparent and need not be removed are then disposed in specified positions on the aforementioned phase-difference film, [c] the phase-difference function of the portions of the phase-difference film on which the aforementioned resist members 4 are not present is eliminated by an appropriate means, and [d] a display member 5 is superimposed or bonded on the side of the resist members 4 following drying.

[0007]

Furthermore, [the present invention also] relates to a method for manufacturing a 3D image display body which is used to display 3D images in which right-eye image display parts *a* and left-eye image display parts *b* are mixed, said 3D image display body manufacturing method being characterized by the fact that [a] a laminated phase-difference film 3 formed by laminating a TAC film 6 or CAB film, etc., that does not possess birefringence and a drawn PVA film 7 that has a phase-difference function is disposed on a transparent support 1 with an adhesive agent 2 interposed so that the TAC film 6, etc., is located on the side of the adhesive agent 2, [b] resist members 4 which are made transparent and need not be removed are then disposed in specified positions on the [aforementioned] drawn PVA film 7, [c] the phase-difference function of the portions of the drawn PVA film 7 on which the aforementioned resist members 4 are not present is eliminated by an appropriate means, and [d] a display member 5 is superimposed or bonded on the side of the resist members 4 following drying.

[0008]

Furthermore, [the present invention also] relates to a 3D image display body manufacturing method which is characterized by the fact that in the 3D image display body

manufacturing method claimed in Claim 2, the resist members 4 are linear bodies that are disposed at specified intervals [on the drawn PVA film 7] from one side of the drawn PVA film 7 to the other.

[0009]

Furthermore, [the present invention also] relates to a 3D image display body manufacturing method which is characterized by the fact that in the 3D image display body manufacturing method claimed in either Claim 2 or Claim 3, the resist members 4 consist of a resist ink that is applied to the surface of the drawn PVA film 7 by screen printing.

[0010]

Furthermore, [the present invention also] relates to a 3D image display body manufacturing method which is characterized by the fact that in the 3D image display body manufacturing method claimed in any one of Claims 2 through 4, a protective member 9 that does not possess birefringence is disposed on the side of the resist members 4 following drying, and a display member 5 is then superimposed on or bonded to this protective member 9.

[0011]

[Operation and Effect of the Invention]

When resist members 4 that are made transparent and need not be removed are disposed in specified positions on a phase-difference film, an appropriate means is then applied to the [portions of the] phase-difference film where the aforementioned resist members 4 are not present, so that the property that the aforementioned phase-difference film has of being able to rotate the direction of vibration of light in a specified wavelength region with the linearly polarized state [of the light] maintained "as is" (i.e., the phase-difference function) is eliminated, a film is obtained in which the phase of the transmitted light is shifted by 180° between the portions where resist members 4 are present and the portions where no resist members 4 are present. In this case, since the resist members 4 are not removed by means of a chemical agent, etc., damage to the phase-difference film can be suppressed to a minimum.

[0012]

[Working Configurations of the Invention]

Figure 2 illustrates a first embodiment of the present invention, which will be described below in detail.

[0013]

A laminated phase-difference film 3 (1/2-wave plate) formed by laminating a TAC film 6 (thickness: 126 μm) and a uniaxially drawn PVA film 7 (thickness: 38 μm) that has a phase-difference function is disposed on the surface of a transparent support 1 (e.g., a glass plate or

cellulose acetate butyrate (CAB) plate, etc., with a thickness of approximately 2 mm) with an adhesive agent 2 (e.g., an ultraviolet-curable resin) interposed, and the ultraviolet-curable resin is cured by means of ultraviolet light. Furthermore, a glass plate that does not possess birefringence is most desirable as the support 1. Moreover, besides a film formed by laminating a TAC film 6 on a drawn PVA film 7, a film formed by laminating a CAB film on such a drawn PVA film 7, etc., may also be used as the laminated phase-difference film 3. In short, any laminated film formed by laminating a film that is substantially free of birefringence on a drawn PVA film 7 may be used as the laminated phase-difference film 3.

[0014]

Next, a transparent urethane-type resist ink (HIPET 9300 Medium manufactured by Jujo Chemical K.K.) which has a high water resistance is applied to the uniaxially drawn PVA film 7 as resist members 4 in specified positions. In this case, the resist ink is [applied in the form of] linear bodies with a width of 160 μm to the surface of the drawn PVA film 7 from one side of the film to the other. These linear bodies are disposed side by side at a pitch of 160 μm. Furthermore, it is not necessary that the resist ink have a uniform width and uniform pitch as described above. Moreover, [the ink] need not be [applied in the form of] linear bodies; it would also be possible, for example, to dispose square bodies (as seen in a plan view) in a staggered arrangement.

[0015]

The aforementioned photoresist in USP 5,327,285 need merely be able to withstand exposure and treatment with a potassium hydroxide solution; no consideration is given to reliability in the case of long-term use with the photoresist left "as is" (for example, coloring and chipping may occur as a result of long-term use). Furthermore, this photoresist is subsequently removed by alkali etching or a water flushing treatment, and there is a danger that the drawn PVA film 7 may be damaged by such alkali etching and that the characteristics of the portions where the resist ink is present and portions treated with hot water as described below may be altered.

[0016]

In this regard, the present embodiment uses a transparent urethane-type resist ink as the [above-mentioned] resist ink; this ink is superior in terms of durability and therefore need not be removed; accordingly, the above-mentioned problems do not arise. Furthermore, the problem of degeneration of the above-mentioned drawn PVA film 7 is also solved, so that the sharpness of the images can also be maintained.

[0017]

After the resist ink has been applied, this [assembly] is immersed for approximately 30 seconds in hot water at a temperature of 80°C (of course, the peripheral surfaces are subjected to an appropriate waterproofing treatment), so that the orientation of the molecules in the drawn PVA film 7 is destroyed by allowing water to permeate into the portions where no resist ink is

present, thus eliminating the aforementioned phase-difference function that was present in the state prior to drawing, i.e., [the phase-difference function] that is intrinsically possessed by the drawn PVA film 7. [In this way,] the portions where the resist ink is present are converted into (for example) right-eye image display parts *a*, and the portions where no resist ink is present are converted into left-eye image display parts *b*. As a result of various experiments, it has been confirmed that the properties of the above-mentioned drawn PVA film 7 are similarly lost if the film is immersed for 5 seconds to 10 minutes in hot water at a temperature of 80°C to 100°C.

[0018]

Next, with the resist ink left "as is," a display member 5 which has a liquid crystal disposed inside is superimposed by means of a magnet, etc., or bonded by means of an appropriate adhesive agent, thus producing a 3D image display body.

[0019]

The positions where the resist ink is applied, i.e., the positions of the right-eye image display parts *a* and left-eye image display parts *b*, are set so that they coincide with the pitch of the liquid crystal cells of the display member 5 that is bonded.

[0020]

A film in which right-eye image display parts *a* and left-eye image display parts *b* are disposed side by side and which is superior in terms of optical characteristics can easily be obtained by means of the above manufacturing method; accordingly, a 3D image display body which has a good function can also easily be obtained.

[0021]

Furthermore, if the respective members are provided in the form of rolls in the above-mentioned manufacturing [process], continuous manufacture is possible, so that the productivity of the 3D image display body is improved even further.

[0022]

When the image from the 3D image display body manufactured as described above is viewed through polarizing eyeglasses consisting of a polarizer-equipped right-eye lens that transmits only the right-eye image from the right-eye image display parts *a* and a polarizer-equipped left-eye lens that transmits only the left-eye image from the left-eye image display parts *b* (i.e., an image that is composed of light that vibrates in a direction that is 90° perpendicular to the direction of vibration of the light composing the right-eye image), the observer can experience the sensation of viewing the above-mentioned image as a three-dimensional image.

[0023]

Figure 3 illustrates a second embodiment of the present invention, which will be described below.

[0024]

In this second embodiment, a UV resin, PVA-type adhesive agent or acrylic-type tacky adhesive material, etc., is applied to the surface of the drawn PVA film 7 as appropriate members 8 in the spaces between the resist ink. Furthermore, a TAC sheet, glass plate or CAB (cellulose acetate butyrate) sheet is laminated as a protective member 9, and a display member 5 is laminated on the surface of this protective member 9. The remainder of this embodiment is similar to the first embodiment.

[0025]

Moreover, the appropriate members 8 and protective member 9 may consist of any appropriate resin coating that does not possess birefringence, so that this coating causes no change in phase.

[Brief Description of the Drawings]

[Figure 1] Figure 1 is an explanatory diagram of a conventional 3D image [display] device.

[Figure 2] Figure 2 is a structural explanatory diagram of a first embodiment [of the present invention].

[Figure 3] Figure 3 is a structural explanatory diagram of a second embodiment [of the present invention].

[Explanation of Symbols]

1 Support
2 Adhesive agent
3 Laminated phase-difference film
4 Resist members
5 Display member
6 TAC film
7 PVA film
9 Protective member
a Right-eye image display parts
b Left-eye image display parts